The Nature Conservancy of Hawai‘i, Hawai‘i Heritage Program. 1989. *Ka‘ena Point Natural Area Reserve Resource Information*. Prepared for State of Hawai‘i, Department of Land and Natural Resources, Division of Forestry and Wildlife, Natural Area Reserves System. Honolulu, HI.

The World Conservation Union (IUCN). 2006. *2006 IUCN Red List of Threatened Species*. Available at: http://www.iucnredlist.org.

U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawai‘i Agricultural Experiment Station. 1967. *Soil Survey of the Islands of Kaua‘i, O‘ahu, Maui, Moloka‘i, and Lāna‘i, State of Hawai‘i*. Washington, D.C. Available at: http://www.ctahr.hawaii.edu/soilsurvey/5is/oahu.htm.

U.S. Department of the Interior, Fish and Wildlife Service. 1993. *Recovery Plan for Panicum fauriei var. carteri*. Portland, Oregon. Available at: http://ecos.fws.gov/docs/recovery_plans/1994/940604.pdf.

U.S. Department of the Interior, Fish and Wildlife Service. 1997. *Recovery Plan for the Maui Plant Cluster*. Portland, Oregon. Available at: http://ecos.fws.gov/docs/recovery_plans/1997/970729.pdf.

U.S. Department of the Interior, Fish and Wildlife Service. 1998. *Recovery Plan for O‘ahu Plants*. Portland, Oregon. Available at: http://ecos.fws.gov/docs/recovery_plans/1998/980810.pdf.

U.S. Department of the Interior, Fish and Wildlife Service. 1999. *Recovery Plan for the Multi-Island Plants*. Portland, Oregon. Available at: http://ecos.fws.gov/docs/recovery_plans/1999/990710.pdf.

U.S. Department of the Interior, Fish and Wildlife Service. June 17, 2003. *Endangered and Threatened Wildlife and Plants; Final Designations or Nondesignations of Critical Habitat for 101 Plant Species from the Island of O‘ahu, HI; Final Rule*. 68 FR 35949-35998. Available at: http://ecos.fws.gov/docs/federal_register/fr4115.pdf.

U.S. Department of the Interior, Fish and Wildlife Service. 2005. *Regional seabird conservation plan*. Portland, (OR): U.S. Fish and Wildlife Service.

U.S. Department of the Interior, Fish and Wildlife Service. 2007. Intra-Service Section 7 Biological Evaluation Form. Honolulu.

U.S. Department of the Interior, Fish and Wildlife Service. 2007. Internal Draft Environmental Assessment: Eradication of Polynesian Rats (*Rattus Exulans*) from Mokapu and ‘Ālau Islands, Hawaii. Honolulu (in prep.)

U.S. Department of the Interior, Geological Survey. 2007. *Geologic Map of the State of Hawai‘i*. Available at: http://pubs.usgs.gov/of/2007/1089/.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999. *Manual of the Flowering Plants of Hawai‘i*. Bishop Museum Press: Honolulu.

Xcluder Pest Proof Fencing Company. 2006. *Xcluder Site Assessment: Feasibility and Costing for Construction of an Xcluder Pest Proof Fence at Ka‘ena Point, O‘ahu, Hawai‘i*. Cambridge, New Zealand.

Xcluder Pest Proof Fencing Company. 2007. personal communications.

Ziegler, A.C. 2002. *Hawaiian Natural History, Ecology, and Evolution*. University of Hawai‘i Press: Honolulu.

APPENDIX A

Notable Species of Native Flora and Fauna Thought to Occur In or Near the Project Area or Potentially Affected by the Proposed Conservation Management

Birds
Laysan albatross (*Phoebastria immutabilis*)***
Wedge-tailed shearwater (*Puffinus pacificus*)
Black-footed albatross (*Phoebastria nigripes*)***

Plants
Achyranthes splendens var. *rotundata**
‘Āwiwi (*Centaurium sebaeoides*)**
‘Akoko (*Chamaesyce celastroides* var. *kaenana*)**
Pu‘uka‘a (*Cyperus trachysanthos*)**
Ma‘o hau hele (*Hibiscus brackenridgei*)**
Kulu‘ī (*Nototrichium humile*)*
Carter’s panicgrass (*Panicum fauriei* var. *carteri*)*
Dwarf naupaka (*Scaevola coriacea*)*
*Schiedea kealiae***
‘Ohai (*Sesbania tomentosa*)**
*Vigna o-wahuensis***

Mammal
Hawaiian monk seal (*Monachus schauinslandi*)*

Rare Natural Communities
Naupaka (*Scaevola coriacea*) Mixed Coastal Dry Shrubland

* = Federally listed Endangered Species
** = Endangered Species, Ka‘ena Point designated as Critical Habitat
***= Federal species of concern

APPENDIX B

PARTIAL INVENTORY OF FLORA AND FAUNA OF THE KA‘ENA AREA

Status:

USFWS
END Endangered
T Threatened
C Candidate species
SOC Species of Concern (unofficial designation)

WORLD CONSERVATION UNION (IUCN)
CR Critically endangered
EN Endangered
VU Vulnerable
NT Near threatened
LC Least concern

X Presumed extinct

Affinity:

N Non-native
P Polynesian introduction
I Indigenous
E Endemic

Family	Taxon	Common/Hawaiian name	Affinity	Status
I. Flora				
Pteridophyta (ferns and fern allies)				
Pteridaceae	*Doryopteris decipiens*	kumuniu	E	
Magnoliophyta (angiosperms)				
Liliopsida (monocots)				
Agavaceae	*Agave* sp.	century plant	N	
Poaceae	*Cenchrus ciliaris*	buffelgrass	N	
Poaceae	*Chloris barbata*	swollen fingergrass	N	
Poaceae	*Chloris radiata*	radiate fingergrass	N	
Poaceae	*Cynodon dactylon*	mānienie	N	
Cyperaceae	*Cyperus trachysanthos*	umbrella sedge	E	END
Poaceae	*Dactyloctenium aegyptium*	beach wiregrass	N	
Poaceae	*Dicanthium aristatum*	wilder grass	N	
Poaceae	*Digitaria ciliaris*	Henry’s crabgrass	N	
Poaceae	*Digitaria insularis*	sourgrass	N	
Poaceae	*Eragrostis variabilis*	kāwelu	E	
Cyperaceae	*Fimbristylis cymosa*	mau‘u ‘aki‘aki	I	
Poaceae	*Heteropogon contortus*	pili	I ?	
Poaceae	*Panicum fauriei* var. *carteri*	Carter’s panic grass	E	END
Poaceae	*Panicum maximum*	Guinea grass	N	
Poaceae	*Panicum torridum*	kākonakona	E	
Poaceae	*Setaria gracilis*	yellow foxtail	N	

Poaceae	*Setaria verticillata*	bristly foxtail	N	
Poaceae	*Sporobolus virginicus*	‘aki‘aki	I	
Magnoliopsida (dicots)				
Malvaceae	*Abutilon grandifolium*	hairy abutilon, ma‘o	N	
Malvaceae	*Abutilon incanum*	ma‘o, hoary abutilon	I ?	
Fabaceae	*Acacia farnesiana*	kolū	N	
Amaranthaceae	*Achyranthes splendens* var. *rotundata*	round chaff-flower	E	END, CR
Asteraceae	*Ageratum conyzoides*	maile hohono	N	
Asteraceae	*Artemisia australis*	‘āhinahina, hinahina kuahiwi	E	
Acanthaceae	*Asystasia gangetica*	chinese violet	N	
Chenopodiaceae	*Atriplex semibaccata*	Australian saltbush	N	
Asteraceae	*Bidens amplectens*	ko‘oko‘olau	E	C, VU
Nyctaginaceae	*Boerhavia coccinea*		N	
Nyctaginaceae	*Boerhavia glabrata*	alena	I	
Nyctaginaceae	*Boerhavia repens*	alena	I	
Capparaceae	*Capparis sandwichiana*	maiapilo	E	SOC, VU
Lauraceae	*Cassytha filiformis*	kauna‘oa pehu	I	
Casuarinaceae	*Casuarina equisetifolia*	common ironwood	N	
Gentianaceae	*Centaurium sebaeoides*	‘āwiwi	E	END, CR
Euphorbiaceae	*Chamaesyce celastroides* var. *kaenana*	‘akoko	E	END, EN
Euphorbiaceae	*Chamaesyce degeneri*	‘akoko	E	
Euphorbiaceae	*Chamaesyce hirta*	hairy spurge	N	
Chenopodiaceae	*Chenopodium oahuense*	‘āheahea, ‘āweoweo	E	
Menispermaceae	*Cocculus trilobus*	huehue	I	
Cuscutaceae	*Cuscuta sandwichiana*	kauna‘oa	E	
Asteraceae	*Emilia sonchifolia* var. *javanica*	Flora’s paintbrush	N	
Fabaceae	*Erythrina sandwicensis*	wiliwili	E	
Malvaceae	*Gossypium tomentosum*	ma‘o, huluhulu, Hawaiian cotton	E	
Boraginaceae	*Heliotropium anomalum* var. *argenteum*	hinahina, hinahina kū kahakai	E	
Boraginaceae	*Heliotropium curassavicum*	kīpūkai	I	
Malvaceae	*Hibiscus brackenridgei*	ma‘o hau hele	E	END, EN
Fabaceae	*Indigofera* sp.	indigo	N	
Convolvulaceae	*Ipomoea cairica*	koali ‘ai	I ?	
Convolvulaceae	*Ipomoea indica*	koali ‘awa	I	
Convolvulaceae	*Ipomoea pes-caprae*	pōhuehue	I	
Convolvulaceae	*Ipomoea tuboides*	Hawaiian moon flower	E	
Convolvulaceae	*Jacquemontia ovalifolia* subsp. *sandwicensis*	pā‘ū o Hi‘iaka	I	
Brassicaceae	*Lepidium bidentatum* var. *o-waihiense*	‘ānaunau	I	SOC
Fabaceae	*Leucaena leucocephala*	koa haole	N	
Campanulaceae	*Lobelia niihauensis*		E	END
Solanaceae	*Lycium sandwicense*	‘ōhelo kai	I	

Convolvulaceae	*Merremia aegyptia*	hairy merremia, koali kua hulu	N ?	
Myoporaceae	*Myoporum sandwicense*	naio	I	
Solanaceae	*Nicotiana glauca*	tree tobacco	N	
Amaranthaceae	*Nototrichium humile*	kulu‘ī	E	END
Amaranthaceae	*Nototrichium sandwicense*	kulu‘ī	E	
Piperaceae	*Peperomia leptostachya*	‘ala‘ala wai nui	I	
Asteraceae	*Pluchea indica*	Indian fleabane	N	
Asteraceae	*Pluchea symphytifolia*	sourbush	N	
Plumbaginaceae	*Plumbago zeylanica*	‘ilie‘e	I	
Portulacaceae	*Portulaca lutea*	‘ihi	I	
Portulacaceae	*Portulaca oleracea*	pigweed	N	
Portulacaceae	*Portulaca pilosa*	purslane	N	
Fabaceae	*Prosopis pallida*	kiawe, algaroba	N	
Rubiaceae	*Psydrax odorata*	alahe‘e	I	
Asteraceae	*Reichardia picroides*		N	
Asteraceae	*Reichardia tingitana*		N	
Santalaceae	*Santalum ellipticum*	‘iliahialo‘e, ‘iliahi, coast sandalwood	E	
Goodeniaceae	*Scaevola coriacea*	dwarf naupaka	E	END
Goodeniaceae	*Scaevola sericea*	naupaka kahakai	I	
Caryophyllaceae	*Schiedea kealiae*	ma‘oli‘oli	E	END
Fabaceae	*Senna gaudichaudii*	kolomona	I	
Fabaceae	*Sesbania tomentosa*	‘ohai	E	END
Aizoaceae	*Sesuvium portulacastrum*	‘ākulikuli	I	
Cucurbitaceae	*Sicyos pachycarpus*	kūpala, ‘ānunu	E	
Malvaceae	*Sida fallax*	‘ilima	I	
Asteraceae	*Sonchus oleraceus*	pualele	N	
Asclepiadaceae	*Stapelia gigantea*	giant toad plant	N	
Malvaceae	*Thespesia populnea*	milo	I ?	
Boraginaceae	*Tournefortia argentea*	tree heliotrope	N	
Zygophyllaceae	*Tribulus cistoides*	nohu	I	
Asteraceae	*Verbesina encelioides*	golden crown-beard	N	
Fabaceae	*Vigna marina*	mohihihi	I	
Fabaceae	*Vigna o-wahuensis*		E	END
Verbenaceae	*Vitex rotundifolia*	pōhinahina, kolokolo kahakai	I	
Sterculiaceae	*Waltheria indica*	‘uhaloa	I ?	
Asteraceae	*Wollastonia integrifolia*	nehe	E	
Asteraceae	*Wollastonia lobata* var. *lobata*	nehe	E	
Asteraceae	*Wollastonia remyi*	nehe	E	SOC
II. Fauna **Chordata** **Aves** **Charadriiformes**				
Sternidae	*Anous stolidus*	brown noddy, noio kōhā	I	LC
Sternidae	*Anous minutus*	black noddy, noio	I	LC
Scolopacidae	*Arenaria interpres*	ruddy turnstone, ‘akekeke	I	LC

Sternidae	*Gygis alba*	white tern, manu-o-Kū	I	LC
Sternidae	*Sterna fuscata*	sooty tern, ‘ewa ‘ewa	I	LC
Sternidae	*Sterna lunata*	grey-backed tern, pākalakala	I	LC
Charadriidae	*Pluvialis fulva*	kōlea, Pacific golden-plover	I	LC
Scolopacidae	*Heteroscelus incana*	wandering tattler	I	LC
	Columbiformes			
Columbidae	*Geopelia striata*	zebra dove	N	
Columbidae	*Streptopelia chinensis*	spotted dove	N	
	Galliformes			
Phasianidae	*Francolinus erckelii*	Erckel’s francolin	N	
Phasianidae	*Francolinus pondicerianus*	grey francolin	N	
	Passeriformes			
Sturnidae	*Acridotheres tristis*	common myna	N	
Fringillidae	*Carpodacus mexicanus*	house finch	N	
Mimidae	*Mimus polyglottos*	Northern mockingbird	N	
Emberizidae	*Paroaria coronata*	red-crested cardinal	N	
Pycnonotidae	*Pycnonotus cafer*	red-vented bulbul	N	
Pycnonotidae	*Pycnonotus jocosus*	red-whiskered bulbul	N	
Zosteropidae	*Zosterops japonicus*	Japanese white-eye	N	
	Pelecaniformes			
Fregatidae	*Fregata minor*	great frigatebird, ‘iwa	I	LC
Phaethontidae	*Phaethon lepturus*	white-tailed tropicbird, koa‘e kea	I	LC
Phaethontidae	*Phaethon rubricauda*	red-tailed tropicbird, koa‘e ‘ula	I	LC
Sulidae	*Sula dactylatra*	masked booby, ‘ā	I	LC
Sulidae	*Sula leucogaster*	brown booby, ‘ā	I	LC
Sulidae	*Sula sula*	red-footed booby, ‘ā	I	LC
	Procellariiformes			
Diomedeidae	*Phoebastria immutabilis*	Laysan albatross, mōlī	I	SOC, VU
Diomedeidae	*Phoebastria nigripes*	black-footed albatross, ka‘upu	I	SOC, EN
Procellariidae	*Puffinus pacificus*	wedge-tailed shearwater, ‘ua‘u kani	I	LC
	Strigiformes			
Strigidae	*Asio flammeus sandwichensis*	pueo, Hawaiian short-eared owl	E	
	Mammalia			
	Carnivora			
Canidae	*Canis lupus familiaris*	domestic dog, ‘īlio	P	
Felidae	*Felis silvestris catus*	domestic cat	N	
Herpestidae	*Herpestes javanicus*	Indian mongoose	N	
Phocidae	*Monachus schauinslandi*	Hawaiian monk seal, ‘īlioholoikauaua	E	END, EN

Rodentia				
Muridae	*Mus musculus*	house mouse	N	
Muridae	*Rattus exulans*	Polynesian rat, ‘iole	P	
Muridae	*Rattus rattus*	black rat	N	
Reptilia **Testudines**				
Cheloniidae	*Chelonia mydas*	honu, green sea turtle	I	T
Arthropoda **Insecta** **Hymenoptera (bees, wasps, and ants)**				
Colletidae	*Hylaeus anthracinus*	yellow-faced bee	N	
Colletidae	*Hylaeus longiceps*	yellow-faced bee	N	
Mollusca **Gastropoda (snails, slugs, etc.)** **Pulmonata**				
Achatinidae	*Achatina fulica*	East African land snail	N	
Succineidae	*Succinea caduca*	amber snail	E	
Stylommatophora				
Endodontidae	*Cookeconcha* sp.		E	
Spiraxidae	*Euglandina rosea*	cannibal snail	N	
Veronicellidae	*Laevicaulis alte*	black slug	N	

APPENDIX C

Summary of Known and Possible Historic Properties at Ka‘ena Point

Summary of Known and Possible Historic Properties at Ka`ena Point

Ka`ena Point Fence and Ecosystem Restoration Project

Ka`ena Point Natural Area Reserve and Ka`ena Point State Park
Ka`ena, Waialua and Keawa`ula, Wai`anae, Oahu
TMK: (1) 6-9-02: 4, 9, 13, 14 and 8-1-01: 6.

State of Hawai`i
Department of Land and Natural Resources

Summary of Known and Possible Historic Properties at Ka`ena Point

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Prepared for:
Division of Forestry and Wildlife
Division of State Parks
Department of Land and Natural Resources

July 2007

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Introduction

The Natural Area Reserve System (NARS), Department of Land and Natural Resources (DLNR) and its partners are considering a proposal to install a predator proof fence at Ka`ena Point Natural Area Reserve (Ka Lae Loa o Ka`ena[1]) and, once established, to pursue an ecosystem restoration project. The Division of State Parks (State Parks) has prepared the following report to assist NARS in the planning process for this project. The report is primarily a summary of known and potential historic properties at Ka`ena Point and, more particularly, those found within the potential project area. Also discussed are actions needed to determine how the project will affect these historic properties and how these effects can be avoided or minimized. As proof of compliance with federal historic preservation laws and regulations will be needed, the report also includes recommendations on fulfilling these requirements. At least one section of the proposed fence line, the southern extent of the alignment, would cross a portion of Ka`ena Point State Park.

This historic properties summary is based primarily on field inspections conducted on January 27 and June 30, 2007 and on a review of reports and other sources available in State Parks files. During the field inspections, State Parks staff was able to examine potential fence alignments with NARS staff and other parties involved in the project and to locate previously recorded historic properties. This allowed us to assess, at least to a preliminary level, the kinds of historic properties that need to be considered during the historic preservation review process and to propose potential fence alignments that would avoid or minimize damage to historic properties. Given the height of the fence and the materials being used, it will be a prominent feature in an otherwise open and scenic landscape and the visual effects of the fence on historic properties and their setting also needs to be taken into account. This could include properties located a considerable distance from the fence.

Information used in the following discussions was drawn initially from four primary sources. The first is a report of archaeological work conducted in the immediate vicinity of the beacon light near the point (Yent 1991a). This report complimented another study conducted at Keawa`ula, Wai`anae located southeast of the current project area (Yent 1991b). The second is the National Register of Historic Places Registration Form prepared in 1988 to support listing of "Kaena Complex" in the Hawai`i Register of Historic Places (Bath and Napoka 1988). A portion of the probable project area lies within the boundaries of the complex. In the third source, a member of the Coastal Defense Study Group, John Bennett, presents a historical overview of the Ka`ena Point Military Reservation and the various structures and buildings constructed by the U.S. Army within the reservation from the 1920s through 1945 (Bennett 2005). The fourth major source is the standard reference *Sites of Oahu* (Sterling and Summers 1978). Originally published in 1962, *Site of Oahu* is a compilation of information on archaeological sites and traditionally significant places culled from Bishop Museum files and records.

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[1] The point is called "ka lae loa o Kaena" in John S. Emerson's survey notes which were written in the Hawaiian Language (Emerson 1854).

Project Description

As currently conceived, the project entails the installation and maintenance of a fence that would create a 500-meter long (0.3 mile) and six-foot high barrier along the eastern edge of the point (Figs. 1, 2, and 3). To be effective it needs to run continuously along the lower edge the steep, western slope of Kuaokala Ridge from point's northern to southern shorelines. The fence would be constructed of closely-spaced aluminum posts and a stainless steel wire mesh with an aperture small enough to exclude potential predators of all age ranges. A rolled hood at the top of the fence prevents predators from crossing over the fence.

Installation of the fence would include ground disturbance, mostly grading, and the excavation of post holes along the chosen route. The alignment needs to be leveled and an earthen or gravel "platform" (4 to 5-meters or 13 to 16 feet wide) created to provide a secure base for the fence that can be maintained and kept free of vegetation. Posts would be buried to a depth of 3 feet (100 cm). The wire mesh skirt needs to be buried beneath the ground surface. An excavator and/or bulldozer would be used during fence installation.

If the Fish and Wildlife Service grant for this project includes other activities, then the potential effect of these actions on historic properties should also be considered in the planning process. One summary of the project indicates that funds remaining after fence construction would, in part, be used to remove or eradicate predators inside the fenced area.

Compliance Framework

As the project grant is from a federal agency and entails the expenditure of federal funds, the granting agency will probably ask to see proof of Section 106 compliance at some point in the grant oversight process. Section 106 of the National Historic Preservation Act and its implementing regulations require all federal agencies to consider the effects of a project on historic properties and to propose measures that will avoid or mitigate these effects. Generally federal law supersedes state law where the federal and state laws are comparable and both could apply. In this case, Section 106 compliance can be conducted in a manner that generally parallels that required under state law and regulations (§6E-8, HRS, and chapter 13-275, HAR).

Under the Section 106 regulations, the federal agency is to enter into a Memorandum of Agreement (MOA) with the State Historic Preservation Officer and project participants if a project will have an effect on significant historic properties. The MOA commits to measures that will avoid or minimize these effects. A MOA will probably be needed for this project. The entity within the U.S. Fish and Wildlife Service that will take on these signatory responsibilities needs to be identified and informed of this possibility. It is not always readily apparent which entity within an agency oversees historic preservation compliance when federal funds are distributed as grants through external programs or non-profit organizations.

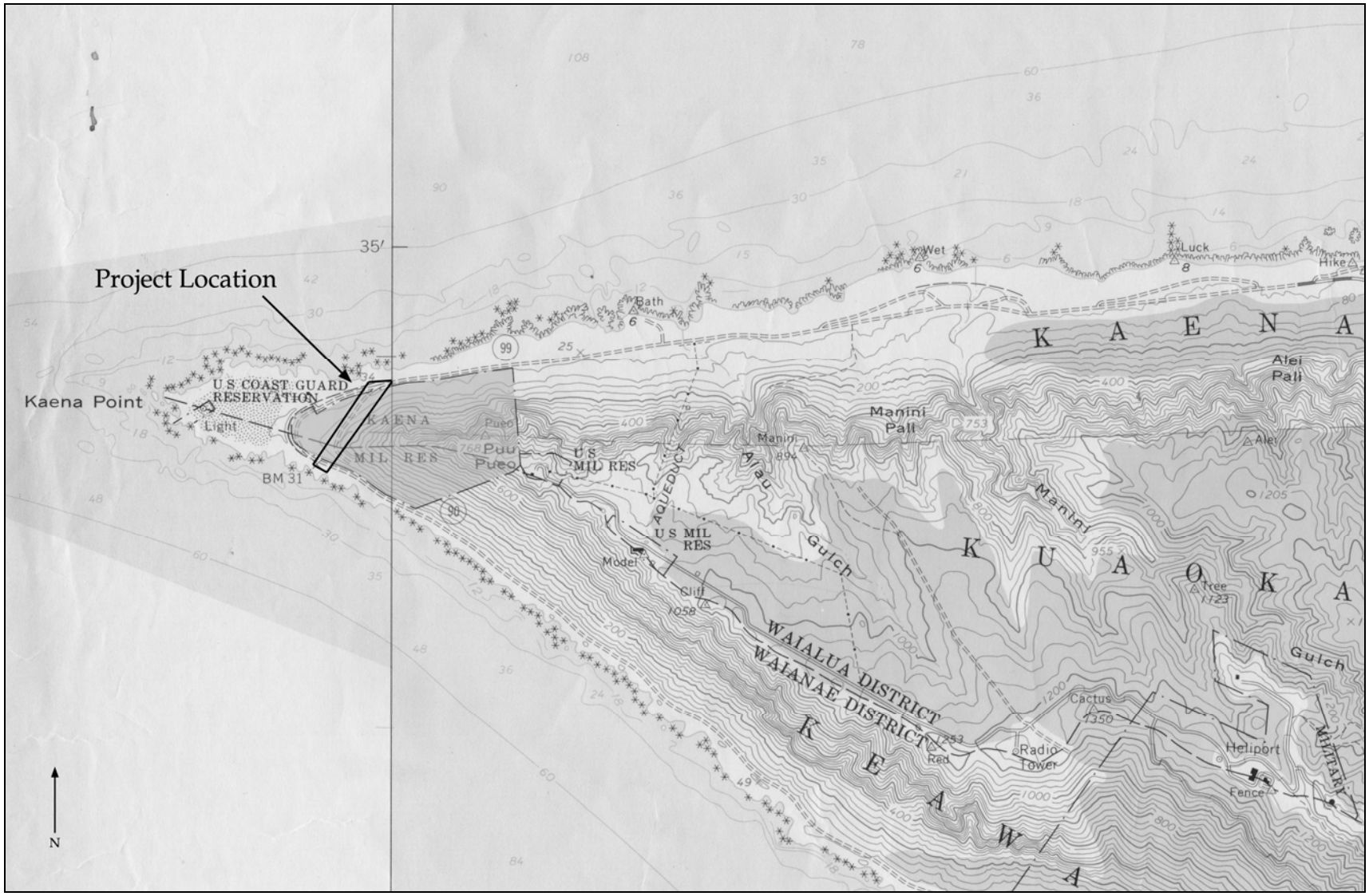

Fig. 1: General Location of Proposed Ka`ena Point Fence Project, Ka`ena and Keawa`ula on USGS Quadrangle (Scale 1:24,000 ft., Kaena, Hawaii Quad., 1983). Ka`ena Point Military Reservation is highlighted.

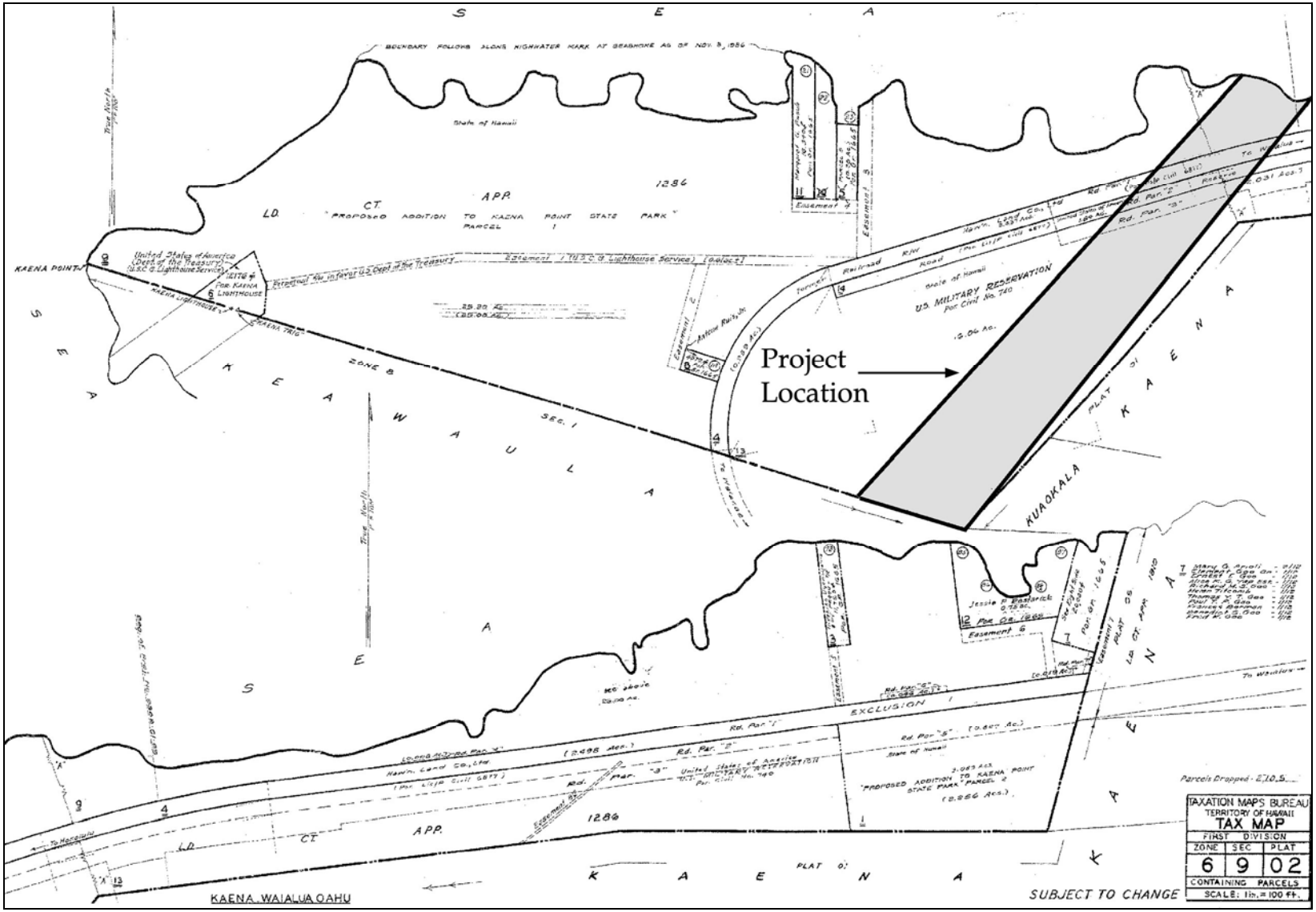

Fig. 2: General Location of Proposed Ka`ena Point Fence Project, Ka`ena, Waialua [TMK: (1) 6-9-02: 4, 9, 13, 14] on Realty Atlas, State of Hawaii, 32nd Edition, 1998.

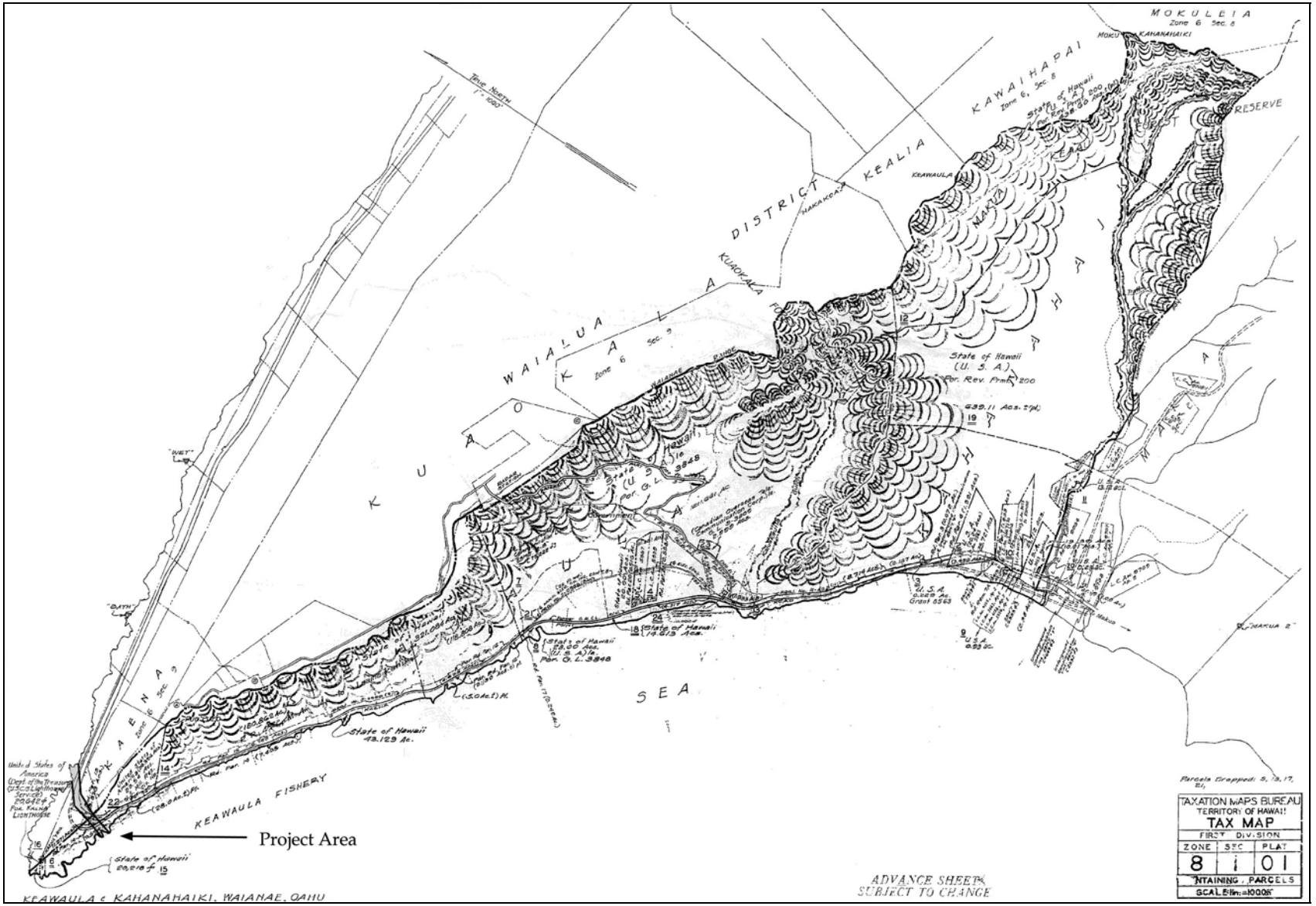

Fig. 3: General Location of Proposed Ka`ena Point Fence Project, Keawa`ula, Wai`anae [TMK: (1) 8-1-01: 6] on Realty Atlas, State of Hawaii, 32nd Edition, 1998.

Known and Possible Historic Properties at Ka`ena Point

Historic properties identified thus far at Ka`ena Point and within the probable project area represent one of the following three, and possibly four, major time-periods and uses:

- Native Hawaiian Subsistence and Cultural Uses: The earliest properties are associated with native Hawaiian subsistence and cultural uses and include pre-contact cultural deposits and burials sites, two stone features probably used for ritual purposes, and landscape features that are significant because of their association with known traditions.

- Pasturage and Ranching: The second grouping potentially reflects grazing or ranching activities that occurred in the area from the 1850s through the 1940s. To date, however, no structural features or other historic properties that could be uniquely or definitively tied to activities from this period were found during previous surveys or during the field inspections.

- Oahu Railway and Land Company (OR&L): The third grouping of historic properties includes those landscape modifications and stone features created during construction and use of the OR&L railway from 1897 to 1947.

- Ka`ena Point Military Reservation: The final grouping is associated with coastal defense facilities constructed by the United States military within the Ka`ena Point Military Reservation which was established in 1923. Constructed between 1923 and 1945, these facilities reflect technological changes in defense systems and strategies that were occurring between World War I and World War II and then the rapid escalation in defense constructed during World War II.

Native Hawaiian Pre-Contact and Early Historic Period Properties

To date, a total of five extant historic properties have been documented at Ka`ena Point which are considered native Hawaiian properties because they represent use of the area prior to Western contact or during the early historic-period (prior to 1850) when predominantly native Hawaiian cultural uses of the area prevailed.

Cultural Deposits and Features

The oldest of these properties may be the subsurface cultural deposits and burial sites located within the prominent sand-dune knoll near the point (Figs. 4 to 7). The cultural deposits were first documented in 1971 during the Statewide Survey of Historic Sites (Site No. 50-80-03-1183) (Bath and Napoka 1988; Yent 1991a: 8). Exposed deposits and remnant stone surface features were recorded in more detail during a 1982 recovery effort prompted by the obvious deterioration of the sand-dune knoll (Yent 1991a: 8). This deterioration was primarily attributed to off-road vehicle use (e.g., four-wheel drive, dune buggies, and motorbikes) which reduced vegetation cover and, in turn, prompted an

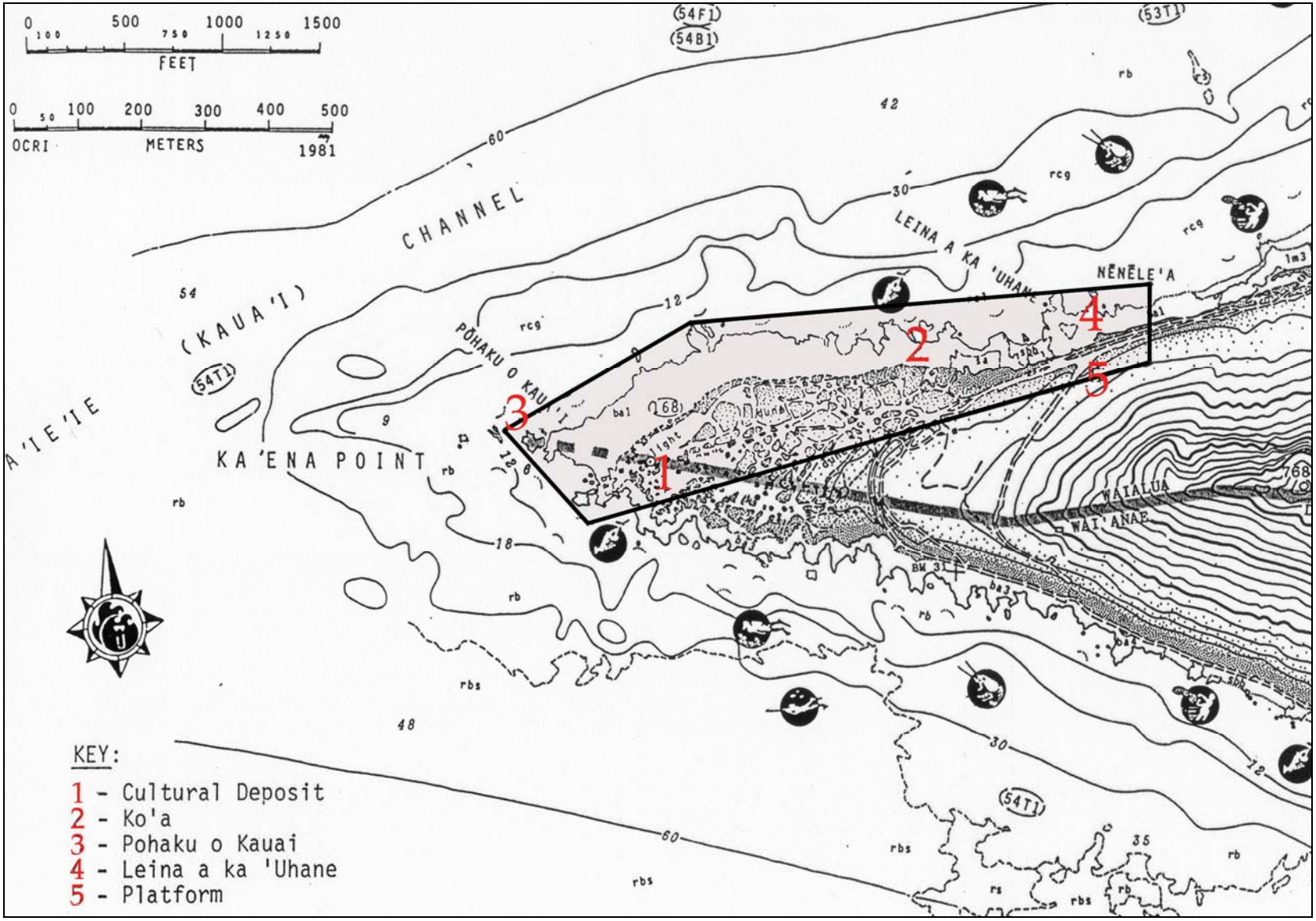

Fig. 4: Location of Ka`ena Complex (Site No. 50-80-03-1183) Boundaries and Major Contributing Features (adapted from Yent 1991a: 8).

Fig 5: Sand Dune Formation Covering West and North Portions of Ka`ena Point (Facing West). Note beacon light in distance.

Fig. 6: Raised Sand Dune Knoll Containing Cultural Deposits and 1989 Beacon Light. Note downed historic 1920 beacon tower to right of beacon (Facing West).

Fig. 7: Exposed Darkened Cultural Layer Near Beacon Light in Sand Dune (Facing South).

Fig. 8: Limestone Formation Named Leina a ka `Uhane or Soul's Leap (Facing West).

increase in wind erosion. Additional data recovery work was conducted in 1989 to mitigate the potential effects of installing the current beacon light and the continued deterioration of the dune remnant (Yent 1991a). The U.S. Coast Guard owns the parcel on which the lighthouse and most of the deposits are found.

Prior to 1989, the site was described as having remnant walls constructed of water-worn basalt stones and two distinct buried cultural layers exposed along the eroding faces of dune remnants (Yent 1991a: 8). The stone walls described on the north and east sides of the knoll in 1971 had been reduced to foundation alignments in 1982 and 1989. This also coincided with an increase in water-worn boulders scattered over the knoll by 1982. The two cultural layers were marked by dark, charcoal-stained sand containing coral and basalt *`ili`ili* (water-worn pebbles used as paving), pit features, a few artifacts (e.g., fishhook fragments, cut mammal bone, volcanic glass, coral and sea urchin files), and midden composed of bird and fish bone, crab, sea urchin, *kukui* nut fragments, marine shells, and charcoal pieces and flecks (Yent 1991a: 8, 12). In 1982, two partial burials exposed by erosion were removed and placed in a more stable reburial site for protection (Yent 1991a: 8).

When data recovery work was conducted in 1989, the upper cultural layer was no longer intact but excavation of the lower cultural layer provided a detailed description of the layer and its variability. An analysis of materials excavated from three test pits in this layer indicates the long-standing importance of fishing and marine resources in this dry, often wind-swept environment. The presence of habitation features in the cultural layer (e.g. living surfaces, *`ili`ili* paving, fire hearths, pits, and distinguishable levels) further suggests a sustained use of the area whether it be on a permanent or recurrent basis (Yent 1991a: 35, 37, 38).

Spatially, the primary cultural deposits on the knoll (Feature 1) extend over an area measuring approximately 30 by 50 meters (98 by 164 feet). Surface midden scatters and darkened sand exposures suggest that the deposits could extend an additional 300 meters (198 feet) to the east and 30 meters (98 feet) to the south of the primary knoll (Yent 1991a: Fig. 5, 12). While no similar deposits have been reported elsewhere in the dune system stretching along the western and northern shoreline of Ka`ena Point (Fig. 5), this site clearly establishes the possibility of cultural deposits and burials being in other sandy areas. This pattern of cultural deposits and burials in the surviving dune remnants, mostly stable knolls or raised, has been documented along the shoreline east and west of Mokuleia.

Stone Platforms

The two stone platforms included in the Hawai`i Register complex are thought to have been constructed for religious purposes (Fig. 4) (Bath and Napoka 1988, Yent 1991a: Fig. 4). Feature 2 was described in 1988 as a partially buried basalt boulder platform with coral pieces scattered among the boulder paving of the platform (Bath and Napoka 1988). The presence of coral and its location on distinct rise above the sand dunes suggested that it could be fishing *ko`a* (shrine or triangulation point). It was suggested that this could be

Fig. 9: Low Stone Platform Located on Rocky Knoll (Facing West). Site may be that labeled Feature 2 of Ka`ena Complex (Site No. 50-80-03-1183).

Fig. 10: Rocky Knoll with Stone Platform and Possible Fishing Shrine (Facing North). Site may be Feature 2 of Site No. 50-80-03-1183.

Fig. 11: Small Rectangular Platform and Possible Shrine Located on Slope above Leina a ka `Uhane (Facing West). Site is Feature 5 of Ka`ena Complex (Site No. 50-80-03-1183).

Fig. 12: View from Possible Shrine to Leina a ka `Uhane (Facing North). Gravel road and railway bed now separate the two features.

Alau`iki, a fishing shrine, recorded by McAllister in his 1930 survey of historic sites on O`ahu. He described Alau`iki as a "group of stones near the edge of the water, no different from other stones in the vicinity" (McAllister 1933: 127). Another map places Alau`iki farther east (Sterling and Summers 1978: 97). The feature shown in Figures 9 and 10 is in the general location of Feature 2 (Figs. 4).

The second stone feature, Feature 5, was described as a "small rectangular platform of basalt cobbles, with scattered coral on the surface" and as being 150 meters (492 feet) upslope (south) of the limestone formation called Leina a ka `Uhane (Soul's Leap) (Figs. 11 and 12) (Bath and Napoka 1988). Its possible religious function is suggested by its size, the presence of coral, upright stones along the edge of the platform, and its vantage point. The ritual nature of Features 2 and 5 are consistent with the prevalence of known fishing shrines in the area and the richness of its off-shore fisheries. McAllister recorded eight named *ko`a* between Keawa`ula and Mokule`ia (McAllister 1933: 124-129; Yent 1991a: 42).

Pohaku o Kaua`i and Leina a ka `Uhane

The two natural formations identified as part of the Hawai`i Register complex, Features 3 and 4 (Fig. 4), should be considered and treated as traditional cultural properties during the federal historic preservation review process. The identification and evaluation of these otherwise natural features rely entirely on known native Hawaiian traditions and beliefs. Feature 3 is a large, partially submerged rock outcrop named Pohaku o Kaua`i (*Lit.* Stone of Kaua`i) (Figs. 13 and 14) and the other a large limestone formation named Leina a ka `Uhane (*Lit*. Leaping Place of Ghosts) (Figs. 8 and 12).

Pohaku o Kaua`i marks the end of a series of partially submerged rock outcrops that form the westernmost extent of O`ahu Island (Fig. 14). As such, it is the westernmost piece of land on O`ahu and that which is closest to the Island of Kaua`i. According to two recorded traditions, this rock formation was once a part of Kaua`i (Bath and Napoka 1988). In one tradition, the heroic demigod Maui attempts to join the islands of Kaua`i and O`ahu by standing at Ka`ena Point and using his famous hook, Manaiakalani, to pull Kaua`i towards O`ahu (Sterling and Summers 1978: 92-93). When he pulled the hook, only a single, huge rock from Kaua`i falls at his feet. This rock then became known as Pohaku o Kaua`i.

In the other tradition, a Kaua`i chief named Ha`upu, a chief known for great feats of strength, hurled a huge boulder from Kaua`i towards O`ahu to forestall what he thought was a fleet of O`ahu warriors about to invade Kaua`i (Sterling and Summers 1978: 93-94). The group was, instead, driving fish towards nets laid off-shore of O`ahu. When the huge boulder fell, it killed the chief Ka`ena who was leading the fishing drive and many of his followers. From then on, the point bore the name of this chief and the large rock was called Pohaku o Kaua`i. Pohaku o Kaua`i is mentioned in other traditions but plays only an incidental role in their story lines (Sterling and Summers 1978: 93-94, 96). The fact that it is mentioned at all demonstrates that it was a commonly known landmark and one worthy of weaving into traditions with a broader scope.

Fig 13: Basalt Rock Formation Named Pohaku o Kaua`i (Facing West). The named rock is the most distant formation in the photograph.

Fig 14: Alignment of Partially Submerged, Rocky Outcrops Forming the Western Point of O`ahu with Pohaku o Kaua`i in the Distance (Facing West).

The limestone formation called Leina a ka `Uhane (Figs. 8, 12, 19, 36) is now the most recognizable and tangible representation of native Hawaiian traditions and beliefs that identify Ka`ena Point as a place where the fate of departing souls is determined as death nears. Departing souls would either pass into one of several spirit realms or be returned to the body to continue life. The fate of these souls often depended on the help or absence of friendly *`aumakua* (ancestral family or personal god) that would guide a soul to the appropriate realm. Such places were said to be on each of the islands (Kamakau 1964: 49).

The earliest reference to definitively associate these beliefs with this particular limestone formation appears in a 1933 newspaper article. It describes Leina a ka `Uhane as the "stratified and overhanging mass of granular limestone between the track and the sea, near No. 63 culvert as the railroad begins to straighten out after the bend" (Sterling and Summers 1978: 94). In another account, one that describes an 1899 trip to the Hale`iwa Hotel on the railway, the train whistle blows at Ka`ena Point and then the passengers saw "Leina-kahuna" (Laina-kauhane) (Sterling and Summers 1978: 94).

The most detailed account of a soul's progression towards spirit realms or a return to life is from S.M. Kamakau in two 1870 newspaper articles (Kamakau 1964: 47-49). He describes the "*leina a ka `uhane* on Oahu" as being "close to the cape of Ka`ena, on its right (or north, *`akau*) side, as it turns toward Waialua, and near the cutoff (*alanui `oki*) that goes down to Keaoku`uku`u." He also depicts this *leina a ka `uhane* as having boundaries. One boundary was at "Kaho`iho`ina-Wakea, a little below Kakahe`e" (probably somewhere within the vicinity of Camp Erdman and the Dillingham Airfield[2]) and the other at "the leaping place (*kawa-kai*) of Kilauea at Keawa`ula" (near the southwestern side of today's Yokohama Bay[3]). At these boundary places, the "helpful *`aumakua*" might bring the soul back to life or guide them to the realm of the *`aumakua*. Places "within these boundaries" were "where souls went to death in the *po pau `ole*, endless night." These boundaries, if correctly located, create an area stretching 4 miles east of the point along the northern shoreline and 3 miles to the southwest of the point along the southwestern shoreline.

Also describing these beliefs as a progression with thresholds of passage is Holokala, McAllister's informant, in 1930. As the soul wanders from an individual nearing death, it comes first to the fishing shrine named Hauone (Site 189; McAllister 1933: 57, 124, 126). At this point, the soul either returns to the body to fulfill its obligations on earth or

[2] The estimated location of Kakahe`e is based on the relative positions of four villages visited by the missionary Levi Chamberlain prior to 1849 (Sterling and Summers 1978: 89) and Emerson's 1896 map (Fig. 16). After turning O`ahu's western point, Chamberlain mentions four villages: Nenelea, Kahakahee, Aukuu, and Mokuleianui. Emerson's map shows a survey point called Nenelea and Mokuleianui probably corresponds to Mokule`ia Ahupua`a. If these settlements are proportionately spaced, Kakahe`e would be in the vicinity of Camp Erdman and the Dillingham Airfield. This also assumes that Kakahe`e is a contraction of Kahakahee.

[3] Two other references mention a Kilauea at Keawa`ulu. McAllister calls the exit of Poha Cave "Kilawea" which he locates at Yokohama Bay (McAllister 1933: 124; Site 184; Yent 1991b: Fig. 3). The "sea cove of Kilauea" is mentioned before the train reaches Ka`ena Point in an 1899 newspaper account of a trip to the Hale`iwa Hotel (Sterling and Summers 1978: 94).

wanders on to "Leina Kauhane at Kaena Point" where "two minor gods" throw the soul into a "pit known as Lua ahi a Kehena" (McAllister 1933: 126). Death occurred when the soul is thrown to the pit. The fishing shrine Hauone was located between Camp Erdman and the western end of Dillingham Air Field (Fig. 16). This coincides broadly with the northeastern boundary described by Kamakau as being at Kakahe`e. Neither Holokala nor McAllister mention the limestone formation and McAllister places the site number of "Leina Kauhane," Site Number 186, at the western extent of Ka`ena Point.

Potential Native Hawaiian Historic Properties

Based on historic accounts and recorded traditions, yet to be identified historic properties are most likely to reflect uses and customs associated with the area's rich fisheries and the lack of any other dominant land uses on a coastal flat consistently described as "waterless" and known for its stifling heat (McAllister 1933: 127). Such unidentified properties could include additional *ko`a* (fishing shrines), the remnants of shelters and settlements for fisherman, burials, canoe landings, and salt-making sites. Historic-period uses of the point have, however, significantly reduced the probability of these properties surviving on the flatter portions of the point or along lower ridge slopes. Much of this area was altered by construction of the railway in 1897 and military coastal defense structures beginning in 1923.

The routine importance of fishing and salt making for native Hawaiians of the region is captured by John .S. Emerson in his 1854 survey notes (Emerson 1854). The notes were submitted to verify the purchase of five government grants stretching from Ka`ena Point eastward along the north coast of Waialua (Figs. 15 and 16). Emerson asks that the government reserve "a right to fisherman & to land [and to] dry & mend nets & to all who wish to make salt as in former days" (Emerson 1854)[4]. He warns that "many persons may be vexed for a lack of a privilege" if it should be conveyed, exclusively, with the purchase of a government grant.

In addition to a right to fish, the survey note confirms the importance of other activities associated with fishing and a perception that access to places suited to these activities might be curtailed when privately-owned parcels were established along the coast. Fishing would be hampered if canoes could not land in customary locations, if fishermen could not use areas suitable for drying and mending nets, or if salt could not be made, in part, to salt and thus preserve fish and other marine resources. Favorable canoe landings might be identified today based on shoreline characteristics and knowledge of in-shore waters, but it would be more difficult to identify specific places where nets were dried and mended or salt was made. These activities would probably take advantage of natural features that did not necessarily require constructed features or landscape modifications.

[4] Under one grant Emerson wrote this requested reservation in Hawaiian: *"Koe i na kanaka lawaia kahi e komo ai na waa a e maloo ai na upena a me kahi e koau ai kapaakai ma na aa pohaku.*"

Fishing and Fisherman Camps and Settlements

The nature and value of the off and near-shore fisheries at Ka`ena Point are also conveyed in recorded traditions and customs. The origins of some of these rich fishing grounds are explained in the legend of Mikoha. One of the legend's characters, Kaihukoa, moves to Wai`anae where she marries a chief named Ka`ena and transforms herself into the fishing grounds located "directly out from the Kaena Point" (Sterling and Summers 1978: 87). She brings with her the "the *ulua*, *kahala*, and the *mahimahi*." Keawa`ulu, the *ahupua`a* of Wai`anae District which extends into the southern third of the point (Figs. 1 to 3), was known for its *aku* and *ahi* fishing grounds (Ii 1959: 98). The coastal fisheries were also noted as particularly productive when submerged, woven basket traps (*hina`i*) were used to catch *kala* and *hinalea*. When describing basket traps in general, Kamakau notes a particular pattern and size of basket trap that was made for *kala* fish at Ka`ena, O`ahu. He also states that Ka`ena was said to be "a land abounding in kala fishs" and describes in detail the methods, rituals, prohibitions, and communal effort involved in making and using basket traps fashioned specifically for *kala* (Kamakau 1976: 82). There were also "plenty of *hinalea* caught by setting traps from the water (*wai*) of Kumalaekawa to the cape of Ka`ena–so many that a stench arose from the racks where they were drying" (Kamakau 1976: 82). Basket traps for catching *hinalea* were also made in strict adherence to particular *kapu*.

Fisherman settlements and camps near Ka`ena Point were first described by the missionary Levi Chamberlain during his trip along the Wai`anae and Waialua coastline sometime prior to 1849 (Sterling and Summers 1978: 60, 89). He traveled northwest by canoe from the village of Keawa`ula (today's Yokohama Bay) to a "cove," presumably a canoe landing, at the southeastern side of Ka`ena Point. In "front of the little cove" was "a cave used by fishermen occasionally for a residence" which was about 30 feet high and had dimensions of 30 and 15 paces (Sterling and Summers 1978: 60). The cave is described as being at "nearly the west point of the island" and south of the Wai`anae and Waialua District boundary which dissects Ka`ena Point in an east-west direction (Fig. 1). He traveled from the cave "a short distance over a very rough path along the shore and came to the mokuna (boundary) of the large divisions of the island Wainai and Waiarua" (Sterling and Summers 1978: 60). This may be the cave called "Ke Ana Moe of Ka`ena" by an informant in 1954 which was said to be used by travelers from Makua to Waialua (Sterling and Summers 1978: 86). This cave may have been obscured by construction of the railway bed.

As Chamberlain heads east of Ka`ena Point, he describes passing "Nenelea a settlement of fisherman and a convenient place for hauling up their canoes" (Sterling and Summers 1978: 89). Based on a labeled survey point (Fig. 16) (Emerson 1896), Nenelea is probably about a mile east Ka`ena Point. Another indication of fishermen settlements may be the "few old house foundations" described by McAllister as being located inland of the railway at Ka`ena Point in 1930. They were rectangular and measured approximately 14 by 20 feet (McAllister 1933: 124). The population of Ka`ena, presumably the entire *ahupua`a*, was listed as 49 individuals for the year 1831 to 1832 (Yent 1991a: 5). This would include all those living on lands from the end of Dillingham

Field to Ka`ena Point (Fig. 16). The boundary between Waialua and Wai`anae Districts divides the point with Ka`ena Ahupua`a taking the northern three-quarters and Keawa`ula Ahupua`a the southern quarter (Figs. 1 to 3).

This emphasis on fishing suggests that additional *ko`a* (fishing shrines) could still be identified along the shoreline or upslope given their known prevalence in the area. McAllister's informants in 1930 identified at least eight named *ko`a* between Keawa`ula and Mokuleia (Yent 1991a: 42; 1991b: 7, Fig. 8). These shrines may not, however, be readily identified as some were no more than several, otherwise indistinct, stones (McAllister 1933: 127).

Salt-Making

A document other than Emerson's survey notes refers to Ka`ena Point as being an important source of salt. In discussing squid (probably octopus) caught off of Mokuleia, a 1905 article in Thrum's Annual notes that salt used in preparing squid likely came from Ka`ena Point "from salt water evaporation in the holes of rocks so plentiful on that stormy coast" (Sterling and Summers 1978: 96). Future surveys should try to identify any areas appearing to be particularly amenable to salt making or having a concentration of holes serving this purpose.

Trails

Other activities described at Ka`ena Point are those associated with the major trail that linked settlements along the Wai`anae coast with those of Waialua on O`ahu's north shore. In portraying the major trails on O`ahu in the early 1800s, John Papa Ii emphasizes the timing of travel at Ka`ena so that the worst of the region's heat can be avoided. He advises that if travelers arrived at Ka`ena in the morning, "they escaped the heat, for they were cooled by the Moae breeze" (Ii 1959: 98). They subsequently went on to Waiakaaiea where they rested "until afternoon, and then continued traveling along the level places of Kawaihapai and Mokuleia." Waiakaaiea is located approximately 1.7 miles east of Ka`ena Point and is also mentioned in the legend of Pikoi-a-ak-Alala as being a canoe landing[5] (Sterling and Summers 1978: 95).

Levi Chamberlain's account emphasized the roughness of the trails. That from Keawa`ula to the point was described as "three or four miles of very rough road laying along the base of the mountain and over rugged lava washed by the sea" and the segment from the canoe landing to the Wai`anae-Waialua District boundary was "a very rough path" (Sterling and Summers 1978: 60). Both accounts mention alternatives. Chamberlain's account demonstrates a preference for travel by canoe which avoids the rugged trail if sea conditions allow. Ii mentions routes that cross the mountain ridge and thus avoid the longer walk around the point and the heat. One route ran from Makua "up

[5] A survey point labeled Kawaiakaaiea on Emerson's 1896 map indicates the approximate location of Waiakaaiea. This is generally consistent with a 1954 informant who places it at a "dry stream past Camp Erdman" (Sterling and Summers 1978: 91).

the mountain and down to Kawaihapai" and the other from Mokule`ia to Makaha (Ii 1959: 98).

A subsequent account suggests that the trail had not improved much by 1880. The four miles between Kawaihapai and Ka`ena were described as "by no means pleasant riding" with the "barren tract, full of boulders large and small, and for the traveler on horseback the route is simply abominable." The "splendid view" at the point, however, did compensate for the "weariness of the barren and rocky road" (Bowser 1880: 490). The five mile stretch from Ka`ena to Makua was worse and deemed "one of the most rugged roads to be found in Oahu." Travel was described as being more "wearisome than dangerous" and proceeding at an "exasperatingly-funeral pace" as the trail "skirts the sea" (Bowser 1880: 490-01).

No remnants of this trail or associated features have been identified. In some sections, the railway and unpaved roads may have obliterated traces of earlier trails if they followed the same route. Features or places potentially associated with the early trail could include trail markers or curbstone alignments, named resting places (*o`io`ina*), shelters, or stone paving used to stabilize the trail. The 1929 and 1940 quadrangle maps of Ka`ena Point (Fig. 17) (Unites States Geological Survey 1929, Army Corps of Engineers 1940 ) and aerial photographs taken in 1939-1940 show a trail or unimproved road paralleling the railway alignment. Some trail segments visible upslope of the railway alignment in Keawa`ula could still be intact (Fig. 35).

Kuaokala Heiau

Another potential historic property to consider when assessing the project's visual effects is a *heiau* once located on the upper crest of the ridge west of Pu`u Pueo. A survey point on Emerson's 1896 map[6] is labeled, in pencil, "Kuaokala Heiau" (Fig. 16) (Hammatt, Shideler, and Borthwick 1993: 8-9). In his 1907 list of *heiau* on O`ahu, Thrum places "Kuokala" Heiau at "Waianae, overlooking Kaena Point" and attributes its construction to settlers from Kaua`i (Hammatt, Shideler, and Borthwick 1993: 10). He notes it was in "ruins." In 1906, Emma Nakuina identifies a *heiau* "at Kuaokala, Waianae" as one of two *heiau* dedicated to "sun-worshiping."

Two other sources reference a "temple at the top of the mountain" (Sterling and Summers 1978: 95) and "the remains of an old *heiau,* or temple of the *native* gods" on "top of a hill near Kaena Point" (Bowser 1880: 491). In first reference, the great fish Kumunuiakea, is dragged to this *heaiu* with its tail leaving a mark on the landscape. In the second, a 1880s guide for travelers, describes the temple as measuring 40 by 20 feet and having walls eight feet tall. It is not clear that all the sources cited refer to the same *heiau* or to that

[6] The 1896 Register Map (1784) is attributed J.S Emerson. This could refer to John S. Emerson or to his son, Joseph S. Emerson. John S. Emerson surveyed the boundaries of the government grants depicted on the map in the 1850s but died in 1867 (Sahlins 1992: 6). His son Joseph worked for the Hawaiian Government Survey from 1877 to 1904 (Moffat and Fitzpatrick 1995: 31).

located by Emerson[7]. Kuaokala is the name of the ridge forming the western terminus of the Wai`anae Mountain range and a land division that encompasses the relatively flat and broad crest of this ridge which is bounded by Ka`ena to the north, Keawa`ula to the southwest, and the *ahupua`a* of Kealia to the east (Figs. 1 and 2). This land division may be an *`ili* of Ka`ena *ahupua`a* as only Ka`ena, not Kuaokala, is listed when lands were divided among the chiefs during the 1848 Mahele. In many cases, *heiau* carry the name of the land on which they are located. The existence of this *heiau*, or any remnants of it, has not been confirmed. After reviewing available information, Hammatt, Shideler, and Borthwick (1993: 8-10) believed that McAllister in his 1930 survey mistakenly assumed that the "Kuakala heiau" mentioned in the literature was the same as Mokaena Heiau. Mokaena Heiau is located to the southwest and primarily overlooks Yokohama Bay.

Pasturage and Ranching (1850s–1922)

The first reference to lands at Ka`ena Point being used for pasturage appears in survey notes prepared by J.S. Emerson for Royal Patent Grants 1804, 1805, 1806, 1807 and 1665 (Emerson 1854) (Figs. 15 and 16). Grant 1665 covers most of the point and the project area. Emerson notes that individuals receiving these five government grants only wished to use the land for pasturage ("Pasturage is all they now profess to desire") and that the customary right to fish and make salt was "a privilege which these men have not paid for" when purchasing the grants.

These five government grants not only reflect a district-wide attempt by Waialua residents to secure land for pasturage, but they may also provide evidence that permanent settlements were absent along the western-most stretch of this coastline in 1850. These particular grants are five of 12 issued in Ka`ena Ahupua`a and five of 290 issued to native Hawaiians in the *ahupua`a* from Kamananui to Ka`ena (Emerson 1896, Sahlins 1992: 168-69). More government grants were issued to native Hawaiians in these *ahupua`a* than in all government-held *ahupua`a* on O`ahu combined.

Several factors contributed to these high numbers. First the *ahupua`a* of Kamananui, Mokule`ia, Kawaihapai, Kealia, and Ka`ena all became government lands in 1848 which made them eligible for sale after 1850. Chiefess Victoria Kamamalu, a granddaughter of Kamehameha I and sister of Kings Kamehemeha IV and V, inherited Waialua District from her mother Kinau in 1839 (Sahlins 1992: 46, 167; Alameida 2003: 40). Kamamalu then relinquished the lands from Kamananui to Ka`ena to Kamehameha III during the Mahele of 1848 and he subsequently designated them government lands. The second factor was John S. Emerson, the American Board of Commissioners for Foreign Missions (ABCFM) missionary assigned to Waialua, who was tireless in his attempts to help the mostly native Hawaiian residents of Waialua obtain fee-simple title to lands during the mid-1800s when customary land tenure was being converted to one of private ownership (Sahlins 1992: 168, Moffat and Fitzpatrick 1995:54-55, and Alameida 2003). The third factor centers on conflicts that became acute during the 1840s over the use of *ahupua`a*

[7] The location of the *heiau* described by Bowser is somewhat ambiguous. He says it is located on top of a hill near Ka`ena Point but only describes it after reaching Makua in the account of his travels. He does not mention it when describing Ka`ena Point or when passing through Ka`ena.

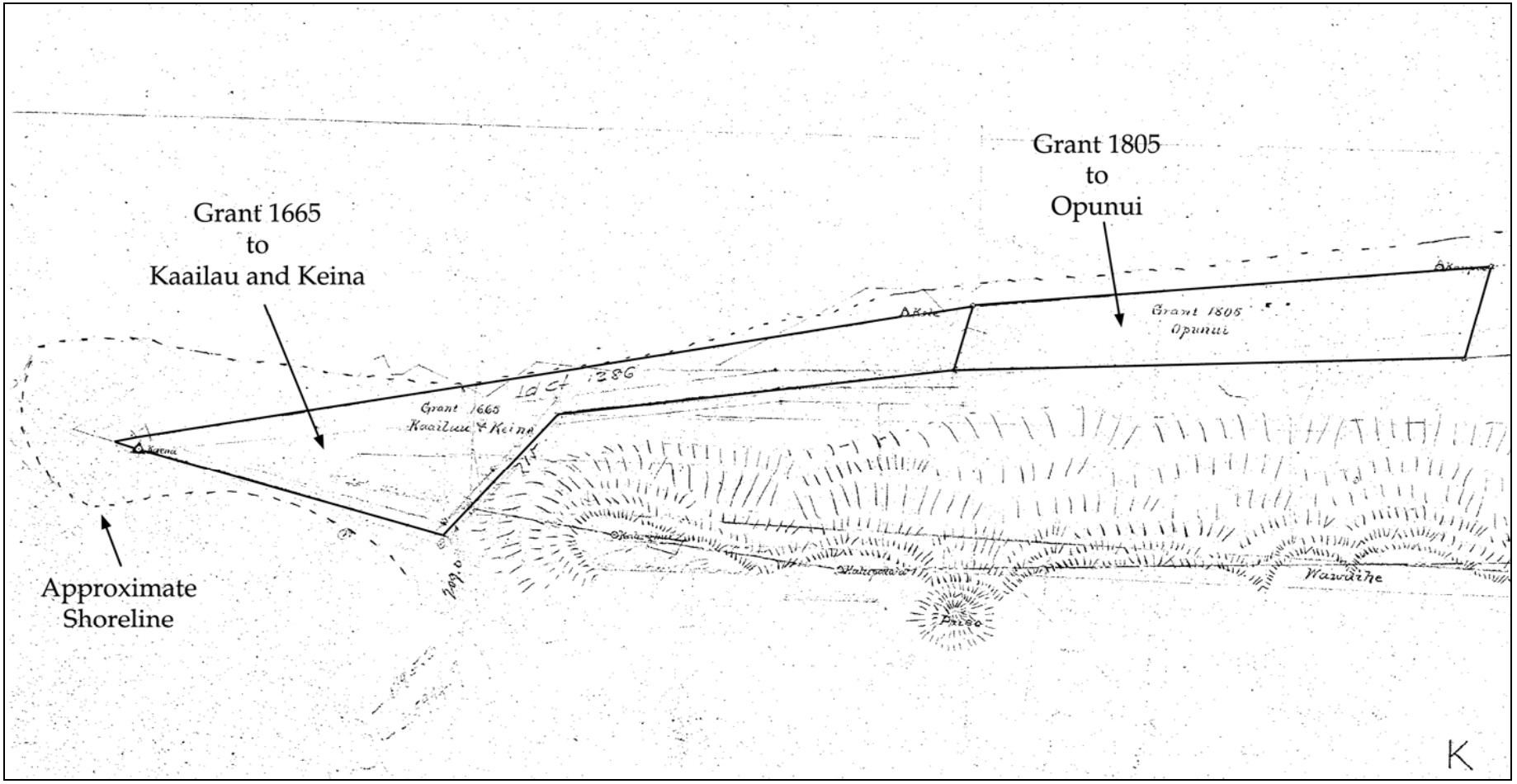

Fig. 15: Location of Grants 1665 and 1805 as Shown on 1896 Map Surveyed by J.S. Emerson (Emerson 1896). Grant boundaries and shoreline were darkened. Grants were obtained primarily for pasturage.

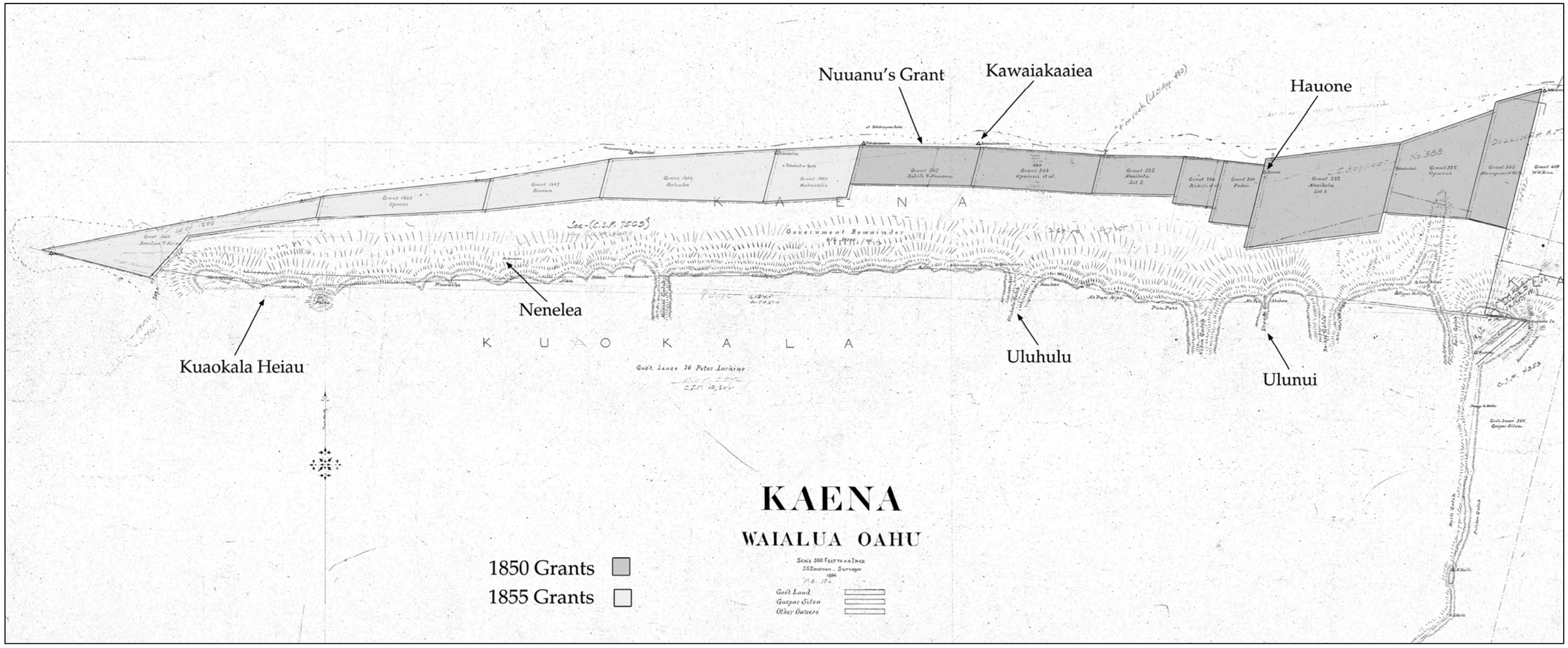

Fig. 16: Location of Government Grants Surveyed and Mapped by J.S. Emerson between 1850 and 1855 as shown on 1896 Map (Reg. Map 1784). Shading distinguishes grants issued in 1850 from those issued in 1855. Annotated places names are discussed in the text.

grasslands and uncultivated lands for pasturage. The *ali`i* who controlled the large *ahupua`a* began to use these lands to graze large herds or to lease them to foreigners for pasturage. Uncontrolled herds were entering cultivated fields of the residents and damaging their crops and were also depleting their source *pili* grass which was essential for thatching (Sahlins 1992: 136, 148-49, 167, and 168). The residents of Waialua also complained that the *ali`i* landholder or agents were denying them use of uncultivated grasslands for grazing as the residents themselves began to acquire their own animals. Access they formerly had to grasslands and other resources of an *ahupua`a* was gradually being denied or diminished.

There were two mechanisms by which *ahupua`a* residents could obtain fee-simple title to land at that time. They could submit claims to the Board of Commissioners to Quiet Land Titles (Land Commission) between 1848 and 1854 and they could purchase government lands which were called Royal Patent Grants (Sahlins 1992: 9, 14, 136, 168; Alameida 2003: 42-43). Lands claimed by native tenants before the Land Commission could only be those that were in active use as house lots or were under cultivation. There were no such restrictions for government grants which allowed the acquisition of much larger parcels and, in some cases, parcels the grantee had not been using or did not previously possess. Emerson actively encouraged tenants of Kamananui, Mokule`ia, Kawaihapai, Kealia, and Ka`ena to withdraw claims made before the Land Commission and to purchase, individually or in a *hui* (a collective), government grants which would be much larger and of sufficient size to compensate for the pasturage and other resources they were being denied in the *ahupua`a* as a whole (Sahlins 1992: 168; Alameida 2003: 42-43). At least 73 claims before the Land Commission were withdrawn in these *ahupua`a* (Sahlins 1992: 168; Alameida 2003: 32). Emerson asked to be and was appointed the government land agent for the district to help process the purchase and mapping of the grants.

The 12 government grants sold in Ka`ena Ahupua`a broadly conform to these generalizations. A significant number were purchased collectively by multiple individuals. Five of the 12 grants in Ka`ena were purchased by two, three or four individuals (Table 1). At least one individual, Nuuanu, withdrew claims submitted to the Land Commission in 1848 and subsequently purchased, along with Kahili, a grant in Ka`ena (Fig. 16). This 30-acre grant appears, in part, to encompass inherited lands which were therefore probably in his possession prior to 1848. His Land Commission claim included six dispersed parcels that were all within Ka`ena (Board of Commissioners to Quiet Land Titles 1848: Vol. 4: 543). One parcel was for a house lot, three were for *lo`i* (irrigated taro patches), one included a single *lo`i* and small piece of *kula* (non-irrigated land), and one was a small piece of *kula.* As the house was from his parents and he calls the parcel with 10 *lo`i* "ancient," use of these lands extends, at a minimum, back to the late 1700s or early 1800s. Some ties between his Land Commission claims and his grant can be traced through place names. Four of the five places named in his Land Commission claims can be matched to names on Emerson's 1896 map (i.e., Kaaiea is probably Kawaiakaaiea; Wehulu is Uluhulu; and Ulunui is identical to Ulunui) (Fig. 16). Emerson's bench mark named Kawaiakaaiea is immediately seaward of Nuuanu and

Kahili's grant and probably confirms that his grant encompassed at least two of his claims[8]. The other two named areas are within a mile of the grant to the east.

The five western-most grants at Ka`ena, Grants 1804, 1805, 1806, 1807 and 1665, are likely examples of grants purchased in Waialua primarily for pasturage and ones that were not in the grantee's possession prior to 1848 (Fig. 16). This is most strongly supported by Emerson's explicit statement that the grantees only wished to use the parcels for pasture (Emerson 1845) and by the fact that he did not mention house lots (*pahale*) or cultivated fields in his survey notes although he clearly raises the issue of customary rights. No 1848 Land Commission claims for house lots or cultivated plots were recorded in this area as occurred farther east along the coast. The rates these grantees paid for the lots also indicate their use for grazing. The rates for these five parcels ranged from 48 to 74 cents per acre with the average rate being 59 cents. According to Emerson's correspondence, the going rate for good, cultivatable lands was $2 per acre; 37½ cents for good *kula* in which the grantee had a previous right; 25 cents for poor *kula* in which the grantee had a previous right; and 50 cents per acre for *kula* in which the grantee had no previous right (Sahlins 1992: 168). The five parcels appear to fall within this last category in which the purchaser had no specific or previous rights to the purchased *kula* lands.

These five western grants were also purchased five years after the seven grants covering the eastern half of the Ka`ena coastline (Table 1). The 1850 grants probably encompass areas in which grantees, such as Nuuanu, had ancestral ties and were using the land for residential and agricultural purposes (Fig. 16). In the 1930s, 20 *lo`i* with stone facings below Uluhulu Gulch were still evident in the eastern half of Ka`ena Ahupua`a as was the spring providing water for irrigated *lo`i* (Handy and Handy 1972: 467). Sweet potato had been the principle crop cultivated along the narrow strip of land between the shoreline and the abrupt cliff faces of the ridge. The agricultural potential of the land diminished westward towards the point.

Most of the government lands and private lands at Keawa`ula and Ka`ena were leased for ranching during the second half of the 1800s and first half of the 1900s. A major portion of Keawa`ula became government land after Laamaikahiki[9] relinquished "½" of the *ahupua`a* to the King during the 1848 Mahele and the King then designated it government land (Yent 1991b: 5; Barrère 1994: 395). The 218.75 acres Laamaikahiki received (R.P. 4522) was hardly half of the *ahupua`a* and also seems to have been some

[8] Nuuanu's 1848 claim was for: A "house lot, which is an old one, from the makuas;" ten *lo`i* at Keokuukuu which was from ancient times; one *lo`i* at Kaaiea 1; one *lo`i* at Kaaiea 2; one *lo`i* and a small *kula* at Wehulu, and a small *kula* at Ulunui (Board of Commissioners to Quiet Land Titles, Native Register Vol. 4: 543).

[9] Little is known about Laamaikahiki although he was of sufficient status to be one of the 252 "Konohiki" to be in possession of large land divisions in 1848. This was the only *ahupua`a* he held (Barrère 1994: 395).

Table 1: Summary of 13 Royal Patent Grants Issued to at Least 18 Individuals, Ka`ena, Waialua. Grants are listed in order from Ka`ena Point west. Names from condemnation papers may indicate families with ancestral ties to Ka`ena.

Grant Number	Grantee	Year Granted	Acres	Place Names Potentially Associated with Grant Based on 1896 Map	Names Listed in Court Condemnation Papers
1665	Kaailau Keina	1855	32	Kole (benchmark); Pueo (hill, inland); Haliipalaia (survey point inland);	
1805	Opunui	1855	26	Wawaihe (inland); Kaupoo (benchmark)	Annie Maunalaahia Billsborough; Kahakauwila; Kauakahiakua
1807	Kauwa	1855	23.10	Nenelea (survey point inland); Alau (inland)	Amia (k)
1806	Kahuhu	1855	43	Keekee (inland); Manini Gulch; Maninikai (benchmark); Maniniuka (survey point inland)	Kekuawae
1804	Kahunalii (k)	1855	25	Koleakaahia (survey point inland)	
247	Kahili Nuuanu[10]	1850	30	Aleu (inland); Kawaiakaaie (benchmark); Holoihonuamea Rocks (inland); Pohakumana (benchmark and rocks)	
248	Opunui Moa Mokunanea Kama	1850	30	Mailekiekie (survey point inland); Uluhulu (inland); Kauhao (inland)	Kahakauila; Kahaule, Gaspar Sylva; Kaiohema; Nailima; Kahuhu; James Finney; Henry Opunui; Daniel Pohakahi; Kenneth K. Hann
232 (Lot 2)	Naaihelu Wahinaemaikai Maili	1850	89 (part)	Na Puu Kipe (inland)	John Ii
246	Kahili	1850	12	Puu Pueo (inland)	Kahanana; Mahaoe; Gaspar Sylva; Opunui, Kahau; Kanewahine
244	Puaki	1850	16	Nihoa Gulch (inland)	Kahiwa; Luhea; Kuahu; Laioha; John Kahuakai; Gaspar Sylva
232 (Lot 1)	Naaihelu Wahinaemaikai Maili	1850	89 (part)	Ulunui Gulch (inland); Keekee Gulch (inland); Aeakukui (survey point on boundary)	
228	Opunui	1850	43	Aeakukui (survey point on boundary)	
243	Hoonapuni Kila	1850	34	Halii Gulch (inland); Kalehu (benchmark)	

[10] Nuuanu submitted a claim to the Land Commission in 1848 (LCA #10360) but later withdrew his claim.

of the least accessible and usable land in the *ahupua`a*[11]. His parcel spanned the rocky slope and shoreline northwest of Yokohama Bay to the Waialua-Wai`anae District boundary that divides Ka`ena Point. In 1873, Samuel Andrews leased both Laamaikahiki's and the government's lands at Keawa`ula for ranching (Yent 1991b 6; Hammatt, Shideler, and Borthwick 1993: 15). He transferred the lease in 1901 to L.L. McCandless who continued to lease the government lands until 1925 when he lost a bid for the lease to Frank Woods. Woods, however, signed the lease over to McCandless after only two years and McCandless continued ranching these lands until his death in 1940 (Yent 1991: 6). At some point, McCandless acquired Laamaikahiki's portion of Keawa`ula.

On the Ka`ena side, Peter Larken began leasing Kuaokala for ranching in 1868 but turned over the lease to Samuel Andrews in 1873 (Hammatt, Shideler, and Borthwick 1993: 15). In the 1880s, Mrs. Kamealani received a government lease for the "Kaena Palis" but did not hold the lease for more than 10 years (Hammatt, Shideler, and Borthwick 1993: 16). McCandless had acquired the lease to Kuaokala as well by early the 1900s. When the privately-owned lands along the coast were acquired by the State of Hawai`i in the 1970s to create Ka`ena Point State Park, all were owned by ranching interests or by families with ranching interests in the area. The Keawa`ula section of the point was owned by Elizabeth Marks who inherited McCandless Ranch and the Ka`ena section was owned by three Dillingham Family heirs (Mary-Mae Wild Bond, Walter Frear Wild, and Urban Earl Wild, Jr.). Mokule`ia Ranch had gained clear or partial title to most of the government grants along the Ka`ena coastline.

Despite references to Ka`ena Point and adjacent lands being used for pasturage, none of the stone features or sites generally associated with grazing or ranching have been identified at the point or within the project area (Yent 1991: 6). There are no stone wall enclosures or corals nor do the perimeters of the 1855 grants appear to have been walled to contain and control grazing cattle or horses. This could indicate that grazing animals in the area were free-roaming despite mapped grant boundaries or that areas were fenced. The only stone wall features found appear to be directly associated, mostly by proximity, with construction of the railway.

Oahu Railway and Land Company (OR&L) (1897-1947)

The former alignment and remnant features of the OR&L railway are among the most visible historic properties at Ka`ena Point (Figs. 17). Given the railway's continuous alignment, the proposed fence and project area must, at some point, cross its former route. When completed in 1898, the new railway provided an important means of transporting passengers, goods, equipment, and produce to and from its many stops along the route from Honolulu to Kahuku by way of Wai`anae and Waialua (Yent 1991a 5-6). It was meant primarily to serve plantation towns and ranches but it also became

[11] The richness of this off-shore fishery may have compensated for the apparent poverty and inhospitable terrain of Laamaikahiki's awarded land. In 1905, a 1570-acre Konohiki Fishery was officially recognized for Laamaikahiki's portion of Keawa`ula (Judgment C.C. No. 5166; Land Office Deed No. 1493). It extended one mile from the shoreline.

celebrated as a scenic tour ending at the Hale`iwa Hotel which was also built by Benjamin F. Dillingham, the founder and owner of the OR&L. The segment around Ka`ena Point to Hale`iwa was completed in 1897. Constructing the railway entailed acquiring a predominately 40-foot right-of-way that was sufficient for the 3-foot wide, narrow gauge rail line and to provide areas for sidings (i.e., auxiliary track permitting trains to pass on the main line) and stations. Services ceased and the railway was abandoned in December 1947. Railroad use waned after World War II when heavy use by the military during the war and post-war periods began to decline and use of the railway was eclipsed by motorized vehicles and improved public roads. Another contributing factor was damage caused by the 1946 tsunami (Yent 1991a: 6). Damage to the tracks and supporting infrastructure were particularly severe at Ka`ena (Fig. 18).

Alignment of the main railway bed is still visible throughout its route as it crosses Ka`ena Point and takes a major turn to round the point (Fig. 17). No traces of the tracks or railroad ties remain. Most of the distinct remnant features of the railway bed were constructed to maintain the shallow or level grade of the railway. In some sections the bed was raised with earth and coral fill (Fig. 19) while in other sections the ridge slope was cut and the fill faced with stone retaining walls (Figs. 27 and 28). Another major feature is a deep cut excavated through the lower slope of the ridge where the railway alignment bends to round the point (Fig. 23). Tailings from this excavation are still visible, either spread or heaped, along the *makai* side of the cut (Fig. 24). Also remaining intact are several sections that were paved with stones or limestone slabs to help stabilize the bed and support the tracks (Fig. 26). Culverts or small bridges, some with stone-work facings, were also constructed along raised sections of the railways bed where it crossed natural drainages.

A number of stone walls also line segments of the railway alignment. Some appear to serve as retaining walls and were variously constructed of water-worn stones taken from the beach (Fig. 21), talus boulders (Fig. 20), or angular stones that could have been extracted from the excavated trench (Fig. 22). A low, free-standing wall parallels some fairly lengthy stretches of the railway alignment both at Ka`ena Point and west of the point (Fig. 25). The function of these walls is not clear. Alone they are not high enough to exclude cattle, horses, or goats that may have been grazing near the track. They may have simply defined the edge of the right-of-way.

In addition to the main railway line, a 15-car siding track once ran from the northern side of the bend towards the point. It is depicted on the 1929 and 1940 topographic maps of Ka`ena (Figs. 17) (U.S. Geological Survey 1929, Army Corps of Engineers 1940) and was presumably used as a supplemental track to allow trains to pass or to temporarily park railroad cars. No physical evidence of this siding was apparent during the field inspection nor can a route resembling it be found on recent aerial photographs. The bed for the siding and any associated features may have been obscured by use of a similar easement that provided access to the Coast Guard Reservation established for the point's beacon light.

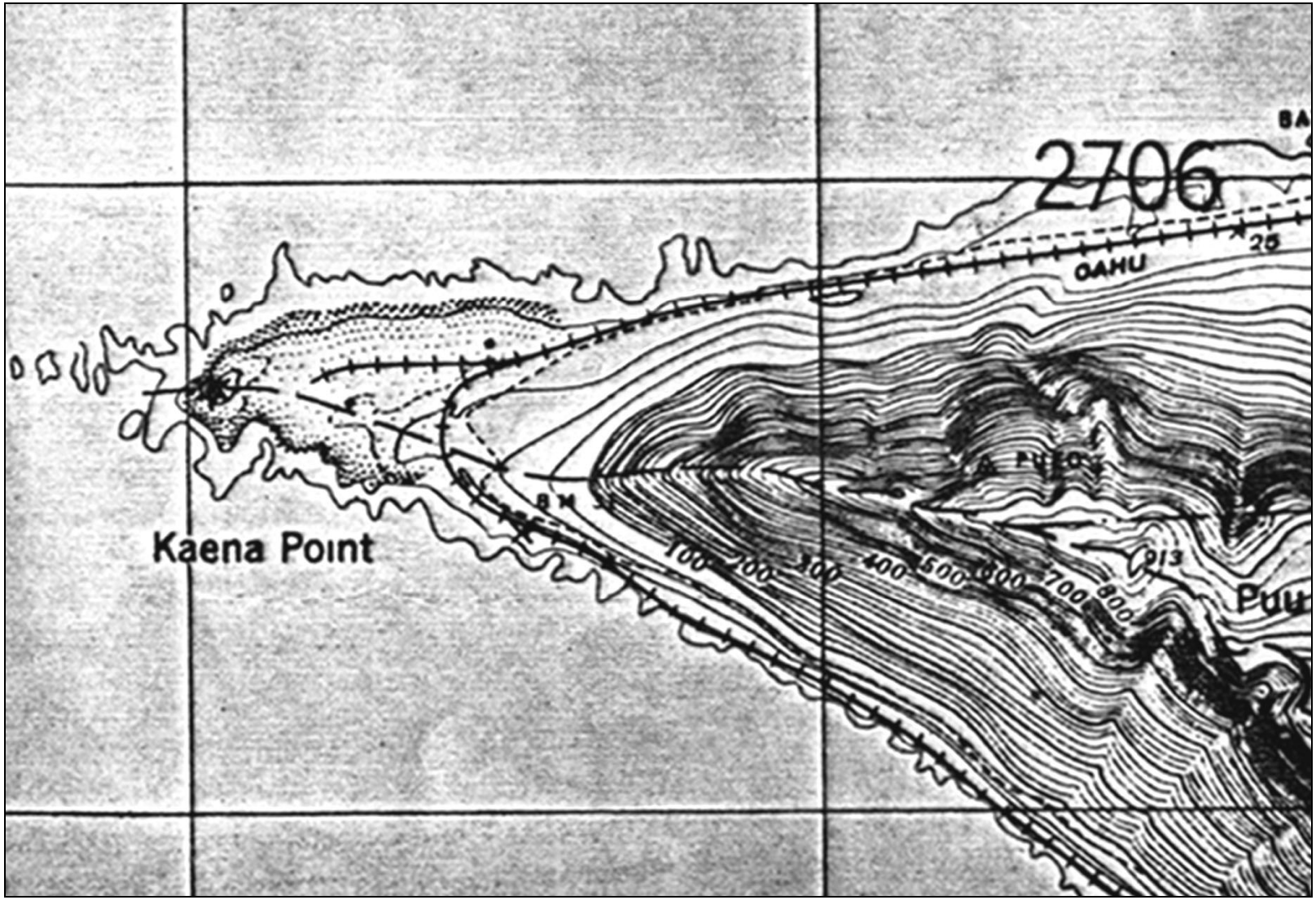

Fig. 17: Route of OR&L Railway as Shown on 1940 Kaena Quadrangle (Army Corps of Engineers 1940). Note siding track extends west of the primary railway alignment and a trail or unimproved road parallels the railway. Depiction of railway and trail are almost identical to that shown on the 1929 Kaena Quadrangle (U.S. Geological Survey 1929).

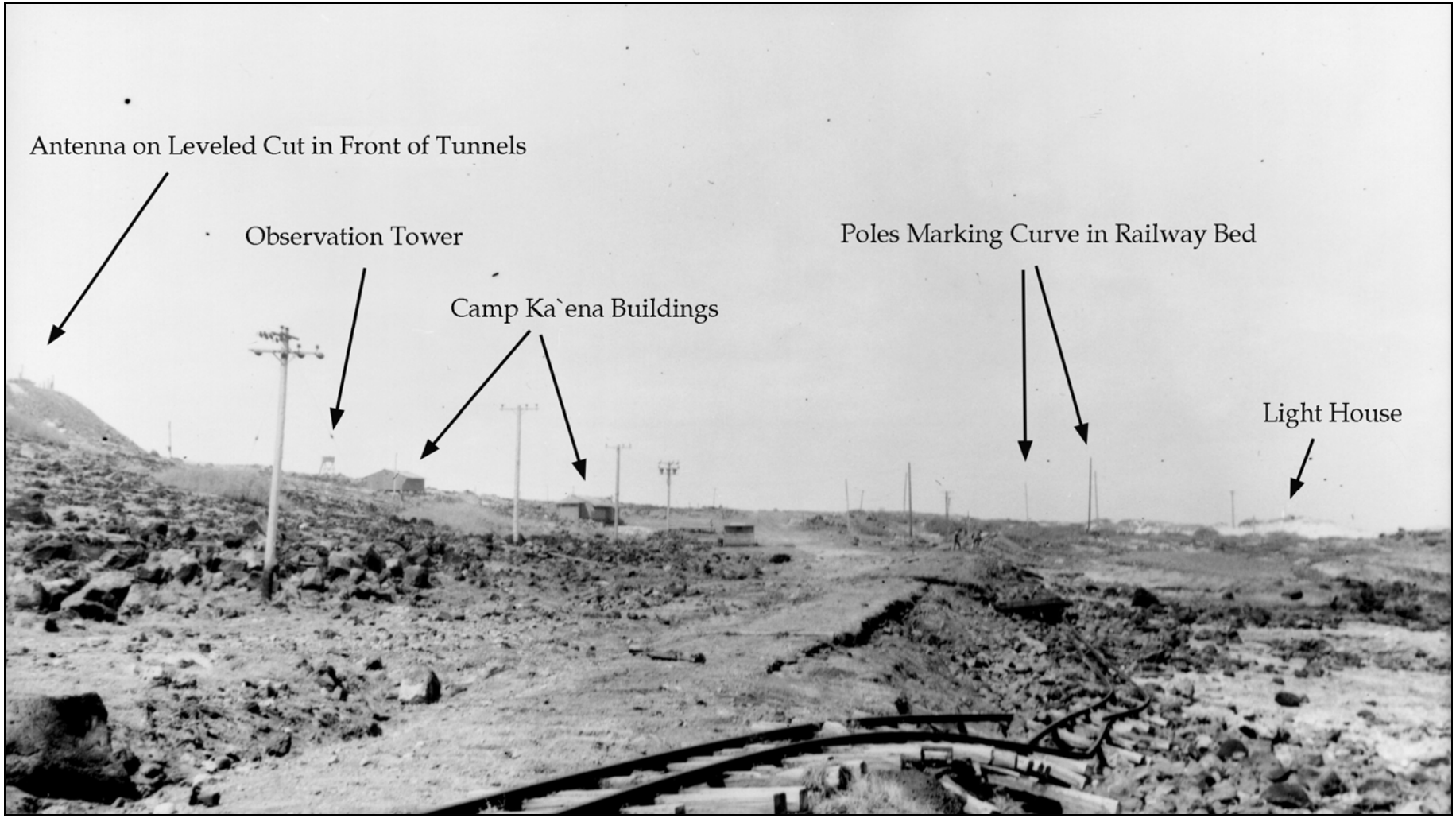

Fig. 18: 1946 Tsunami Damage to Railway at Ka`ena Point (Facing Southwest). Photograph by Kent W. Cochrane (Bishop Museum Neg. No. CN47052). Annotations identifying various features added.

Fig. 19: Raised Railway Bed Alignment near Northeastern Extent of the Project Area (Facing Northeast)

Fig. 20: Low Rock Wall Paralleling Railway Alignment near Southern Extent of Project Area (Facing Southeast). Note gravel tailings from tunnel construction upslope and white gunite coating the BCN-409 Southern Tunnel entrance.

Fig. 21: Rock-Faced Retaining Wall for Railway Bed Southeast of the Project Area (Facing Northwest)

Fig. 22: Close-Up of Rock Retaining Wall for Railway Bed (Facing Southeast).

Fig. 23: Railway Bed Cut at Major Bend in the Right-of-Way (Facing North).

Fig. 24: Tailings from Railway Alignment Cut (Facing North).

Fig. 25: Limestone Slab Pavement on Railway Bed near Southern Extent of Project Area (Facing Southwest).

Fig. 26: Rock Retaining Wall along *Mauka* Edge of Railway Bed near Northern Bend in the Alignment (Facing Northwest). Note use of water-worn stones.

Fig. 27: Rock Retaining Wall along Edge of Railway Alignment near Northeastern Extent of the Project Area (Facing Southeast).

Fig. 28: Rock Retaining Wall along *Makai* Edge of Railway Bed near Northern Bend in the Alignment (Facing North). Note use of angular stones.

At least one individual, Robert L. Meyer, was living at Ka`ena Point after the railway began operating in 1897. He, his wife, and son were said to live "in a shack he built near a rock called Leina Kauhane" (McGrath, Brewer, and Krauss 1973: 84; Hammatt, Shideler, and Borthwick 1993: 17). An expert throw-net fisherman, Meyer would give the railroad engineers fish in exchange for water or other necessities. No remnants of his house site have been found to date but it remains a possibility.

Ka`ena Point Military Reservation (1923 to 1964)

The greatest and most lasting impacts on Ka`ena Point's landscape can be attributed to construction of military defense facilities beginning in 1924 and continuing through 1946 (Bennett 2005). The strategic location of the island's western-most point and its well-positioned promontories were recognized as coastal defense plans were being prepared after World War I and when defense outposts were rapidly intensified and expanded after the 1941 attack on Pearl Harbor. The remnant military structures and altered landscape features at Ka`ena Point represent both major phases in the development of O`ahu's defense infrastructure. Of these, four complexes of structures and associated features still exist within or near the project area and a fifth might be identified with additional inspections. These include fire control and base end stations built on a ridge knoll in 1924 and 1934; a search light position established in 1942; an early-warning radar station that was in operation by 1942; a cantonment established in 1942 for military personnel manning the various operations, and a battery begun in 1943. These complexes are a testament to advances made in defense technologies and strategies over a 22-year period and to their sometimes rapid obsolescence. Use of what became the Ka`ena Point Military Reservation declined after World War II when it was used primarily for "squad and company-sized maneuvers" (Bennett 2005: 100). In 1984, a portion of the Reservation was declared excess property and deeded to the State of Hawai`i for park purposes.

Fire Control Station "S"

The first defense feature constructed at Ka`ena Point was the fire control station designated Station "S" (Figs. 29 and 30). Built in 1924, this reinforced-concrete station with observation slits (8 feet wide; 13 feet deep) was located below Pu`u Pueo at an elevation of 573 feet (Bennette 2005: 75). Station "S" was part of a network of artillery fire control stations established around O`ahu on various ridges and promontories. Observations from these stations were used to triangulate and plot the position of enemy ships which would then be conveyed to the assigned Coast Artillery battery for firing. As part of the Coast Artillery District's Coastal Defense of Pearl Harbor, position data from Station "S" were transmitted to Battery Williston, Fort Weaver, on the west side of Pearl Harbor's entrance channel (Bennette 2005: 75). Telephone communication wires, probably buried within the railway easement, were used to transmit data from Station "S" to Battery Williston and to other stations within the system. Mules were used to haul construction materials to the site given the absence of suitable roads.

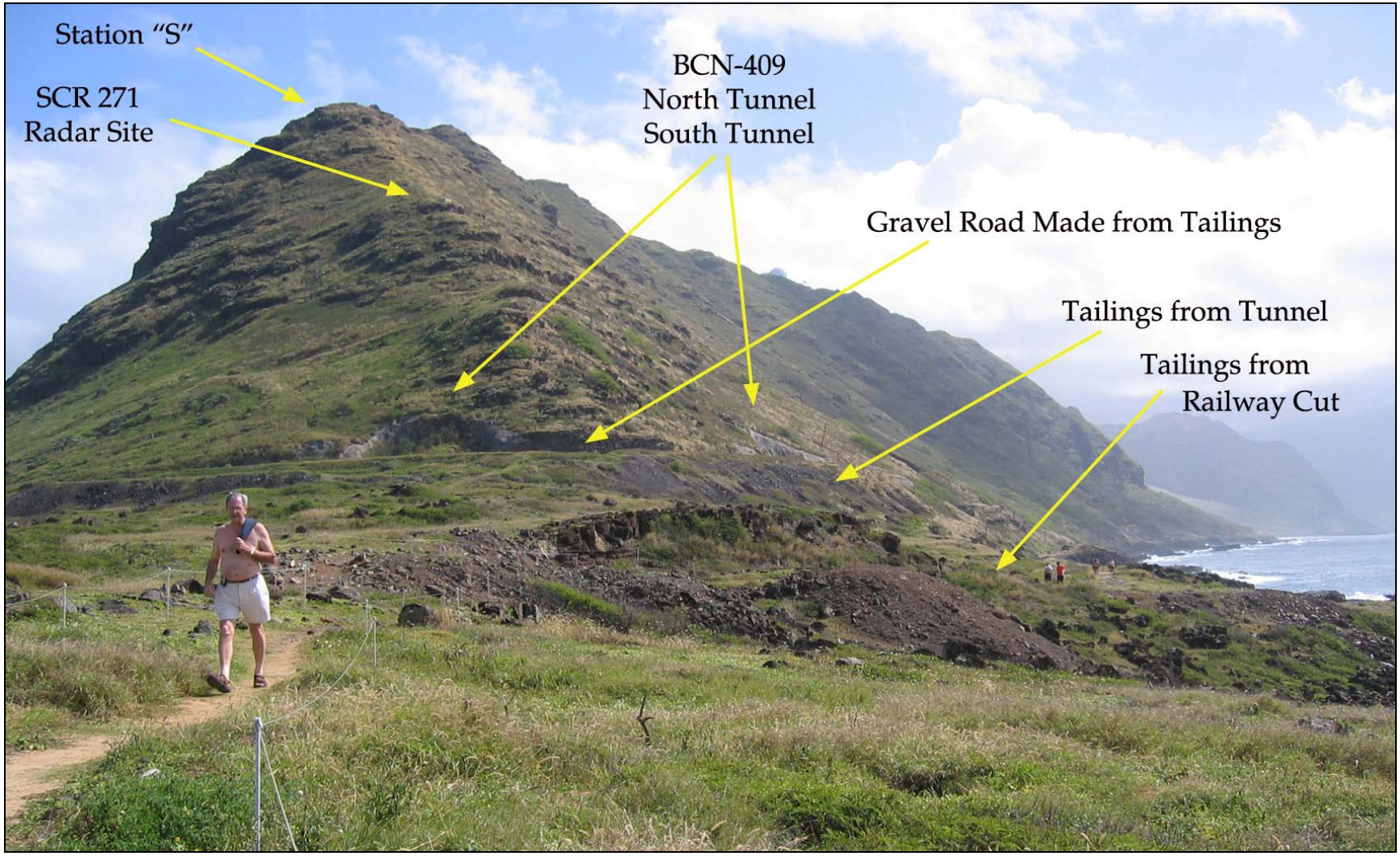

Fig. 29: Major Military Structures and Landscape Modifications and Tailings from Railway Cut (Facing East).